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6E3093

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B. Tech. VI Sem. (Main & Back) Exam. May/June-2014
Electronics & Communication Engineering
6EC6.3 Elective Optimization Techniques

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly.*

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1._____ 2._____

UNIT-I

Q.1 (a) Briefly discuss historical development of the optimization method. Also write five applications of optimization in electronics and communication engineering. [10]

(b) A firm manufacturing two types of electrical items A and B can make a profit of Rs. 20 per unit of A and Rs. 30 per unit of B. Each unit of A requires 3 motors and 2 transformers and each unit of B requires 2 motors and 4 transformers. The total supply of these per month is restricted to 210 motors and 300 transformers. Type B is an expert model requiring a voltage stabilizer, which has a supply restricted to 65 units per month. Formulate above as a linear programming problem for maximum profit. [6]

OR

Q.1 (a) Briefly discuss six different basis for classification of optimization problem. [10]

(b) A firm manufactures headache pills in two sizes A and B. Size A contains 2 grains of aspirin, 5 grains of bicarbonate and 1 grain of codeine; size B contains 1 grain of aspirin, 8 grains bicarbonate and 6 grains of codeine. It has been found by users that it requires at last 12 grains of aspirin, 74 grains of bicarbonate and 24 grains of codeine for providing immediate effects. Formulate above as a linear programming problem for the least number of pills a patient should have to get immediate relief. [6]

UNIT-II

Q.2 (a) Solve the following problem using the revised simplex method: [8]

Minimize $Z = x_1 + 2x_2$

subject to $2x_1 + 5x_2 \geq 6$; $x_1 + x_2 \geq 2$; $x_1, x_2 \geq 0$.

(b) Use duality to solve the following LPP : [8]

Min $Z = 3x_1' + x_2$

s.t. $x_1 + x_2 \geq 1$; $2x_1 + 3x_2 \geq 2$ and $x_1 x_2 \geq 0$.

OR

Q.2 (a) Use simplex method to solve the following LPP :

Minimize $Z = x_1 + 2x_2 + 3x_3 - x_4$

s.t. $x_1 + 2x_2 + 3x_3 = 15$

$2x_1 + x_2 + 5x_3 = 20$

$x_1 + 2x_2 + x_3 + x_4 = 10$

and $x_1, x_2, x_3, x_4 \geq 0$. [8]

(b) (b) Use duality to solve the following LPP :

Min $Z = 40x_1 + 35x_2$

s.t. $2x_1 + 3x_2 \leq 60$

$4x_1 + 3x_2 \leq 96$

$x_1 \geq 0$, $x_2 \geq 0$. [8]

UNIT-III

Q.3 (a)Solve the following transportation problem by Vogel's approximation methods. [8]

		Destination			
		D1	D2	D3	Supply
Origin	O1	2	7	4	5
	O2	3	3	1	8
	O3	5	4	7	7
	O4	1	6	2	14
Demand		7	9	18	34

(b) Solve the minimal assignment problem whose effectiveness matrix is given blow: [8]

Persons \ Jobs	1	2	3	4
A	2	3	4	5
B	4	5	6	7
C	7	8	9	8
D	3	5	8	4

OR

Q.3 Solve the following transportations problem by the lowest cost entry method and test its optimality. [16]

	D1	D2	D3	D4	Supply
F1	8	10	7	7	50
F2	12	9	4	7	40
F3	9	11	10	8	30
Demand	25	32	40	23	120

UNIT-IV

Q.4 (a) Use Dichotomus search method to find the maximum of $f(x) = x\ (5-x)$, in the interval [0, 8], taking $\delta = 0.001$. [8]

(b) Minimize $Z = f(x) = \frac{1}{3}(x_1 + 1)^3 + x_2$

Subject to $g_1(x) = -x_1 + 1 \leq 0$, $g_2(x) = -x_2 \leq 0$

by using interior penalty method. [8]

OR

Q.4 (a) Minimize the function:

$f(x_1, x_2) = 6x_1^2 + 2x_2^2 - 6x_1 x_1 - x_1 - 2x_2$

using Powell's method of conjugate directions. [8]

(b) Solve by univariate search method:

Minimum: $f = 2x_1^2 - 2x_1 x_2 + 5x_2^2 - 6x_1 + 6x_2 + 5$ [8]

UNIT-V

Q.5 Solve the following L.P problem by dynamic programming:

Maximize : $Z = 500\ x_1 + 800\ x_2$

Subject to : $5x_1 + 6x_2 \leq 60$, $x_1 + 2\ x_2 \leq 16$, $x_1 \leq 8$, $x_2 \leq 6$, $x_1, x_2 \leq 0$,

Verify your solution by solving it graphically. [16]

OR

Q.5 Determine -

Max $Z = y_1^3 + y_2^3 + y_3^3$

Subject to $y_1\ y_2\ y_3 < 5$, yi > 0 and integral. [16]
